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REMARKS

I. Introduction

Upon entry of the present amendment, claims 1-5, 14-28, 39-46, and 53-54 will be pending in this application. Without conceding to the correctness of the Examiner's restriction requirement, Applicants have cancelled claims 6-13, 29-38, 47-52, and 56-77 in the interest of advancing the prosecution of this case.

Applicants note with appreciation the Examiner's indication that claims 44-46 would be allowable if rewritten to overcome rejections made under 35 U.S.C. 112, second paragraph. The Examiner states that a microscope structure having a support structure that comprises a top member supporting only one lens, a base supporting a microscope slide where the base and the top member are hinged to each other and wherein the support structure comprises a slide positioning mechanism and focusing mechanism and the supporting structure substantially encloses a slide for viewing is patentable. Accordingly, Applicants have rewritten claim 44 as an independent claim (incorporating all limitations of the base claim) and amended it to recite a "lens" rather than an "aperture optimized" lens. Accordingly, allowance of claims 44-46 is respectfully requested.

Applicants have also amended claim 1 to more fully clarify the claim.

II. Information Disclosure Statement

The Examiner has objected to the Information Disclosure statement filed on January 15, 2002 as failing to comply with 37 CFR 1.98, which requires a list of all patents, publications, or other information submitted of consideration by the Office. This objection is unclear. As shown by the postcard and Form PTO 1449 attached at Tab A, Applicants submitted a PTO 1449 listing

the materials cited in connection with the Information Disclosure Statement, along with 20 publications. Accordingly, Applicants respectfully request that these materials be considered in accordance with the rules.

III. The Drawings

The Examiner has objected to the drawings as failing to show these reference numerals:

- "10a-10e" in Figs. 18(A)-(C);
- "42" in Fig. 21;
- "47" in Fig. 22;
- "51" in Figs. 23(A-B);
- "58" in Fig. 24;
- "72" in Fig. 27.

Proposed corrected drawings having the proposed corrections marked in red ink are submitted with this response at Tab B.

IV. The Specification

The Examiner has objected to the specification as not including a Summary that provides a brief technical description of the invention. Applicants have amended the specification accordingly.

The Examiner has also objected to the specification as having incomplete formulas and incomplete descriptions of the drawings. Applicants have noted that some of the formulas in the application as filed include typographical errors. The amendments submitted with this response set forth the proper equations. For example, the square root formula on page 7 in the denominator of that fraction has a right parentheses missing. To the right of the square root sign, the expression should read $(1-(1+k)c^2r^2)$ and the top of the square root function should extend over the equation. Applicants have amended the remaining formulas in the specification accordingly.

Finally, the Examiner has objected to the specification as failing to provide antecedent basis for a hook and lip mechanism or a finger pressure catch as claimed in claim 46. Applicants disagree. Page 55 of the specification described finger pressure catches and the figures show a hook and lip mechanism. Accordingly, Applicants respectfully request that the Examiner withdraw this rejection.

V. Claim Objections

The Examiner has objected to claims 27-28 as being of improper independent form for failing to limit the subject matter of a previous claim. The Examiner's position is that claim 27 recites an image capture device for capturing and reproducing an image of an object, but that the base claim 1 recites that there is substantially no opening between the system and a viewer' eye. This objection is unclear. The element "a device for capturing and reproducing an image of an object is not the same element as a microscope having "substantially no openings between a viewer's eye and the object being viewed." As set forth in the specification at page 50, a device for capturing a reproducing an image could be a camera, such as a video camera, a digital camera, and so forth. Accordingly, this claim *does* limit claim 1 by reciting a microscope with an image capturing and reproducing device, in addition to a microscope having "substantially no openings between a viewer's eye and the object being viewed." Accordingly, Applicant requests that this rejection be withdrawn.

VI. 35 U.S.C. 112

The Examiner has rejected claims 1-5, 14-26, 39-46 and 53-55 under 35 U.S.C. § 112, second paragraph, as being indefinite.

A. Claim 1

The Examiner's position is that claim 1 is unclear because it omits essential structural cooperative relationships of elements. Claim 1 has been amended to clarify that the slide containing the object is positioned within the structure. Thus, the structure supports a lens and encloses the slide, and the object to be viewed is positioned on the slide.

B. Claims 2, 5, 41, and 54

The Examiner's position is that claim 2 is unclear because the phrase "aperture optimized" is not clear, and the specification does not provide a standard for ascertaining the requisite degree. Applicants disagree and request that this rejection be withdrawn. The specification indicates how to provide an aperture optimized lens. See, e.g., pages 16-20 and 24-27. Based on this description, one of ordinary skill in the art would understand the meaning of the terms "aperture optimized" lens.

C. Claim 17

The Examiner has rejected claim 17 because the feature "the cam" lacks proper antecedent basis. Applicants have amended claim 17 from reciting "the cam" to recite "the cam structure" (as first set forth in line 2, element (a)).

D. Claim 24

The Examiner has rejected claim 24 as indefinite for reciting a combination of light sources. The Examiner's position is that a light source cannot be a combination of different sources. Applicants disagree, but in the interest of pursuing this application to allowance, have amended claim 24 to remove "and any combination thereof."

E. Claim 39

The Examiner has rejected claim 39 as indefinite for reciting a combination of different surfaces. The Examiner's position is that the lens cannot have a combination of different surfaces. Applicants disagree, but in the interest of pursuing this application to allowance, have amended claim 39 to remove "and any combination thereof."

F. Claim 43

The Examiner has rejected claim 43 as indefinite for reciting a combination of different removal structures. The Examiner's position is that the structures cannot be combined. Applicants disagree, but in the interest of pursuing this application to allowance, have amended claim 43 to remove "and any combination thereof."

G. Claim 53

The Examiner has rejected claim 53 as being unclear for reciting a "housing adapted to retain and self-contain a microscope slide." The Examiner has not indicated why this is considered unclear. The specification and figures describe and show examples of a "housing adapted to retain and self-contain a microscope slide." Without conceding to the correctness of the Examiner's comment and in the interest of advancing the prosecution of this application, Applicants have amended claim 53 to recite that the slide is enclosed.

H. Claim 54

The Examiner has rejected this claim because it (a) uses of the term "aperture optimized lens" and (b) "the object" lacks proper antecedent basis. First, the rejection based on the term "aperture optimized lens" is discussed above in section B. Second, Applicants have amended claim 54 to include proper antecedent basis for the term "the object."

I. Claim 55

The Examiner has rejected this claim because it (a) uses of the term "aperture optimized lens" and (b) the term "may be" is unclear. Without conceding to the correctness of the Examiner's rejections, Applicant has cancelled claim 55 without prejudice or disclaimer.

VII. 35 U.S.C. 102

A. Smith

The Examiner has rejected claims 1-5, 14, 16, 39, 41-43, and 53-55 under 35 U.S.C. § 102(b) as being anticipated by Smith et al. (U.S. Patent No. 3,656,840). The Examiner's position is that Smith discloses an optical device for viewing an object that comprises a structure (10) having a top member (14) for supporting one and only one lens (34) and a bottom member (12) for supporting a slide position mechanism. Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

First, Applicants respectfully submit that the Examiner has misinterpreted the usage of the term "slide" in the pending claims and the difference between the meaning of "slide" used by the Smith reference and Applicant's application. Smith's slide position mechanism is not designed to be used with *microscope* slides, as recited in the presently-amended claims, but with unmounted specimens. Each rejected independent claim has been amended to clarify that the claimed slide is a "microscope slide."

Additionally, the mechanism that positions the disk-like piston 20 of the Smith reference is a focusing device, not a device that moves and positions a microscope slide in a plane perpendicular to the axis of the lens, as recited by the presently-amended claims. The invention described by the Smith reference does not anticipate the claimed invention because Smith does

not disclose or suggest a device adapted to move and position the microscope slide in a plane perpendicular to the axis of the lens. The Smith reference's piston is for focus control in the Z axis direction, not the X-Y plane. Each independent claim has been amended to clarify that the claimed microscope includes a feature that is adapted to move and position the microscope slide in a plane perpendicular to the axis of the lens.

B. Wallace

The Examiner has rejected claims 1-2, 5, 16, 18, 22-26, 53 and 54 under 35 U.S.C. § 102(b) as being anticipated by Wallace (U.S. Patent No. 4,095,874). The Examiner's position is that Wallace discloses an optical device for viewing an object that has a top member (14) for supporting a lens and a bottom member (10). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

The device shown and described by the Wallace reference has cut-outs 52 in the top member. See Figures and col. 4, lines 26-40. In other words, the Wallace reference does not teach a structure that has substantially no openings between a viewer's eye and the microscope slide as Applicant claims. By contrast, Wallace teaches opening 52.

Additionally, the Examiner's reasoning in making this rejection does not make sense. The Examiner states that if the user placed the Wallace structure in close contact with his/her eye, there would be no openings formed between the structure and the viewer's eye. Although that may be the case, that is irrelevant because the pending claims do not require that feature. The claims are directed to a structure *itself* that has substantially no openings between a viewer's eye and the microscope slide, meaning there are substantially no openings in the *structure,* such that the structure provides a barrier without openings between the object being viewed and the

eye. Any open space between a viewer's eye and the structure in use is irrelevant. The claims are directed to the features of the actual structure.

The Examiner also states that the term "aperture optimized lens" is readable for the lens used in any device because any lens has a definite "aperture optimized" feature and the pending claims fail to provide sufficient structure of the "aperture optimized lens." Applicants disagree and request that this rejection be withdrawn. As discussed above, the specification indicates how to provide an aperture optimized lens, and Applicants are using the term consistent with that definition to mean a lens that has been optimized according to the description provided. See, e.g., pages 16-20 and 24-27. Based on this description, one of ordinary skill in the art would understand the meaning of the terms "aperture optimized" lens. As such, the Wallace reference does not anticipate the claimed invention.

C. Onanian

The Examiner has rejected claims 1-2, 5, 14, 19-21, 53 and 54 under 35 U.S.C. § 102(b) as being anticipated by Onanian (U.S. Patent No. 4,568,148). The Examiner's position is that Onanian discloses a collapsible microscope having a top section (12) with one lens (24) and a bottom section (14) supporting a slide positioning mechanism. Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

Similar to the discussion above, Applicants respectfully submit that the Examiner has misinterpreted the claim term "substantially no openings between the structure and the viewer's eye" and the meaning of "aperture optimized" lens. Applicants reassert and incorporate by reference the above arguments related to these issues. With respect to the "openings," Applicants point out that the Onanian device has open ends. Additionally, the Onanian device

does not include a device adapted to move and position the microscope slide in a plane perpendicular to the axis of the lens, as recited by the independent claims rejected over this reference. As such, neither the Wallace or Onanian references not anticipate the claimed invention.

VII. 35 U.S.C. 103

The Examiner has also rejected claim 40 under 35 U.S.C. § 103(a) as obvious over Wallace in view of Richard (U.S. Patent No. 5,818,634). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

The Examiner's position is that claim 40 is obvious because using a diffractive lens in a magnifying system is suggested to one skilled in the art by the Richard patent. Claim 40 depends from claim 39 and claim 1. Accordingly, at least because those claims have been shown to be patentable, Applicants assert that claim is patentable at least because it depends from those claims.

Version with markings to show changes made:

In the specification

On page 7, kindly amend the equation as follows:

[EQ. 1:

$$z = \frac{cr^2}{1 + \sqrt{(1 - (1 + k)c^2r^2)}} + \alpha_1 r^2 + \alpha_2 r^4 + \alpha_3 r^6 + \alpha_4 r^8 + \alpha_5 r^{10} + \alpha_6 r^{12} + \alpha_7 r^{14} + \alpha_8 r^{16}$$

where Z is the surface sag,

R is the base radius of curvature of the lens,

$c = 1/R$,

k is the conic constant,

α_I are coefficients on powers of r

and r is the radial lens position.]

EQ. 1:

$$z = \frac{cr^2}{1 + \sqrt{(1 - (1 + k)c^2r^2)}} + \alpha_1 r^2 + \alpha_2 r^4 + \alpha_3 r^6 + \alpha_4 r^8 + \alpha_5 r^{10} + \alpha_6 r^{12} + \alpha_7 r^{14} + \alpha_8 r^{16}$$

where Z is the surface sag,

R is the base radius of curvature of the lens,

$c = 1/R$,

k is the conic constant,

α_I are coefficients on powers of r

and r is the radial lens position.

On page 8, kindly amend equation beginning at line 13 as follows:

[EQ. 2:

$$MTF(\nu) = \frac{(Max_I - Min_i)/(Max_I + Min_i)}{(Max_o - Min_o)/(Max_o + Min_o)}$$

Where:

Max_I = maximum image intensity

Min_i = minimum image intensity

Max_o = maximum object intensity

Min_o = minimum object intensity]

EQ. 2:

$$MTF(\nu) = \frac{(Max_i - Min_i)/(Max_i + Min_i)}{(Max_o - Min_o)/(Max_o + Min_o)}$$

Where:

Max_i = maximum image intensity

Min_i = minimum image intensity

Max_o = maximum object intensity

Min_o = minimum object intensity

On page 9, kindly amend the equation beginning at line 4 as follows:

[EQ. 4:

$$Z = \frac{0.61\Sigma}{NA}\ ]$$

EQ 4:

$$Z = 0.61\lambda$$

NA

On page 10, line 19, kindly delete the heading "Summary of the Invention."

On page 12, line 16, before the heading "Brief Description of the Drawings" kindly insert the following paragraph:

--Summary

This invention provides a portable single lens microscope that provides structure between the eye and the microscope slide, preferably including a single lens having an aperture optimized to attain the best image resolution, preferably including a focus mechanism, preferably including a slide holding and moving mechanism, and preferably including a slide position locking mechanism, or any combination of these structures and mechanisms. It includes methods for determining an optimum aperture size for a single lens microscope (and other uses) including a lens of any type, and methods for designing a single lens microscope lens system that provides superior image quality. A single lens microscope according to the present invention can provide substantial and unexpected imaging benefits over previous single lens microscopes and compound microscopes.--

On page 22, kindly amend the equation beginning at line 21 as follows:

[EQ 9:

$$z = \frac{cr^2}{1 + \sqrt{(1-c^2r^2)}} + \alpha_2 r^4 + \alpha_3 r^6 + \alpha_4 r^8 + \alpha_5 r^{10} + \alpha_6 r^{12} + \alpha_7 r^{14} + \alpha_8 r^{16}$$

EQ 9:

$$z = \frac{cr^2}{1 + \sqrt{(1-c^2r^2)}} + \alpha_2 r^4 + \alpha_3 r^6 + \alpha_4 r^8 + \alpha_5 r^{10} + \alpha_6 r^{12} + \alpha_7 r^{14} + \alpha_8 r^{16}$$

On page 32, kindly amend the equation beginning at line 21 as follows:

[EQ. 10:

$$> = ;A_1 \Psi^{21} \quad (i=1 \text{ to } N)$$

Where:

> = optical phase

A_1 = coefficients on even powers of Ψ

Ψ = radial coordinate of lens]

EQ. 10:

$$\Phi = \Sigma A_i \rho^{2i} \quad (i=1 \text{ to } N)$$

Where:

Φ = optical phase

A_i = coefficients on even powers of ρ

ρ = radial coordinate of lens

On page 10, line 19, kindly delete the heading "Summary of the Invention."

On page 12, line 16, before the heading "Brief Description of the Drawings" kindly insert the following paragraph:

--Summary

This invention provides a portable single lens microscope that provides structure between the eye and the microscope slide, preferably including a single lens having an aperture optimized to attain the best image resolution, preferably including a focus mechanism, preferably including a slide holding and moving mechanism, and preferably including a slide position locking mechanism, or any combination of these structures and mechanisms. It includes methods for determining an optimum aperture size for a single lens microscope (and other uses) including a lens of any type, and methods for designing a single lens microscope lens system that provides superior image quality. A single lens microscope according to the present invention can provide substantial and unexpected imaging benefits over previous single lens microscopes and compound microscopes.--

In the claims:

Kindly cancel claims 6-13, 29-38, 47-52, and 55-77 without prejudice or disclaimer to the subject matter thereto.

Kindly amend the claims as follows:

1. (Amended) A microscope adapted for viewing an object positioned on a microscope slide, wherein the microscope slide is positioned within a structure, the microscope comprising:

(a) one and only one lens having a optical axis; [and]

(b) a structure adapted to support the lens; the structure comprising [and]

(i) a device adapted to position the microscope slide [object] a specific distance from the lens; and

(ii) a device adapted to move and position the microscope slide in a plane perpendicular to the optical axis of the lens,

wherein the structure [containing] has substantially no openings between a viewer's eye and the microscope slide [object being viewed] and at least partially [enclosing] encloses the microscope slide and the object being viewed when the microscope is in use in order to minimize the possibility of injury to the viewer's eye.

14. (Amended) The microscope of claim 1, [further comprising:

(i) an object positioning device; and

(ii)]

wherein the device adapted to move and position the microscope slide in a plane perpendicular to the optical axis of the lens comprises an object positioning device and a locking apparatus adapted to lock and hold the [object positioning] device in position relative to the structure.

17. (Amended) The microscope of claim 14, wherein the locking apparatus comprises

(i) a cam structure; and

(ii) a clamp,

wherein tightening of the cam structure causes the clamp to secure the object positioning device.

24. (Amended) The microscope of claim 23, wherein the light source comprises a source selected from the group consisting of sunlight, firelight, incandescent light, fluorescent light, electrically activated phosphors, photographic flash, solid-state light production devices, LEDs, transmitted light, and reflected light[, and any combination thereof].

39. (Amended) The microscope of claim 1, wherein the lens is selected from the group consisting of a ball lens, a glass ball lens, a double convex lens, a meniscus lens, an aspheric lens, a kino-form-corrected aspheric double convex lens, a kino-form-corrected aspheric meniscus, a flat-field apochromatic single-element simple microscope lens, a plano/spheric convex lens, a plano/aspheric convex lens, a plano/diffractive lens, a plano/diffractive-spheric convex lens, a plano/diffractive-aspheric convex lens, a diffractive plano/spheric convex lens, a

diffractive plano/aspheric convex lens, a double convex spheric/spheric lens, a double convex spheric/aspheric lens, a double convex aspheric/aspheric lens, a double convex diffractive-spheric/aspheric lens, a double convex spheric/diffractive-aspheric lens, a double convex aspheric/diffractive-aspheric lens, a double convex diffractive-aspheric/diffractive-aspheric lens, a spheric/spheric meniscus lens, a spheric/aspheric meniscus lens, an aspheric/aspheric meniscus lens, a diffractive/diffractive mensicus lens, a diffractive-spheric/spheric meniscus lens, a diffractive-spheric/diffractive-spheric meniscus lens, a diffractive-spheric/aspheric meniscus lens, a spheric/diffractive-aspheric meniscus lens, an aspheric/diffractive-aspheric meniscus lens, and a diffractive-aspheric/diffractive-aspheric meniscus lens[, and any combination thereof].

41. (Amended) A microscope support structure, comprising:

(a) one and only one aperture optimized lens;

(b) a slide positioning mechanism adapted to move and position the microscope slide in a plane perpendicular to the axis of the lens; and

(c) a focusing system adapted to focus an image of an object;

wherein the support structure defines a substantially enclosed space adapted to receive a slide for viewing.

43. (Amended) The microscope support structure of claim 42, wherein the at least partial separability between the top cover and base is provided by a connection means selected from the group consisting of the top cover and base being completely removable from one another, the top

cover being adapted to slide off the base, and the top cover and base being hinged[, and any combination thereof].

44. (Amended) [The] A microscope support structure [of claim 42] comprising a substantially enclosed space adapted to receive a slide for viewing, the microscope support structure comprising:

one and only one lens;

a slide positioning mechanism;

a focusing system adapted to focus an image of an object;

a top cover supporting the lens; and

a base adapted to support a microscope slide,

wherein the top cover and the base are hinged and wherein the top cover is separated from the base by rotation about the hinge.

53. (Amended) A pocket-sized microscope comprising a housing supporting a single lens, the microscope having no other lens, the housing adapted to retain and [self-contain] enclose a microscope slide for viewing and safety, the housing adapted to substantially enclose a microscope slide, the microscope further comprising features that position the microscope slide a specific distance from the lens and that move and position the microscope slide in a plane perpendicular to the axis of the lens.

54. (Amended) A single lens microscope for viewing [objects] at least one object, comprising:

(a) a structure maintaining an aperture optimized lens; and

(b) a base, comprising:

(i) a slide positioning device adapted to move and position the microscope slide in a plane perpendicular to the axis of the lens,

(ii) a focusing mechanism, and

(iii) a light receiving controller,

wherein the structure and the base are opposable and adapted to at least partially enclose the at lease one object being viewed.

CONCLUSION

For at least the above reasons, Applicant respectfully requests allowance of the pending claims and issuance of a patent containing these claims in due course. If there remain any additional issues to be addressed, the Examiner is urged to contact the undersigned attorney.

PETITION FOR EXTENSION OF TIME

Pursuant to 37 C.F.R. 1.136(a), Applicant herewith petitions that the period for response to the Office Action dated September 10, 2002, in connection with the above-identified application be extended for three months, to and including March 10, 2003. A check for this fee is enclosed. The Commissioner is hereby authorized to charge any additional fees or credit any overpayment to Deposit Order Account No. 11-0855.

Respectfully submitted,

Kristin D. Mallatt

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